

## Metadata for: Climate data - High resolution projections

*This table provides essential information about the program data.*

| Title | Climate data - High resolution projections  |
|-------|---|
|       | <p>Under the Climate Change Modelling and Monitoring Program, Environmental Monitoring and Reporting Branch (EMRB) has been funding grant projects focused on enhancing the governments regional climate science and modelling capacity and refining regional climate change information in Ontario.</p> <p><b>SPEAKER EVENT:</b><br/>The 2014 Best in Science Symposium brought together an unprecedented cross-section of over 150 Ontario leaders and experts dedicated to understanding and addressing climate change. Presentations from academia and OPS staff highlighted the important role science plays in driving action on climate change across the province. Proceeding of the Nov 27-28, 2014, BIS Symposium containing all presentations is available for downloading at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2014-BIS-Symposium-Proceedings.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2014-BIS-Symposium-Proceedings.pdf</a></p> <p>The following is a list of all MOECC-EMRB funded projects on regional climate modelling and impact assessment in chronicle order.</p> <p>In 2009-10, EMRB funded the following grant projects:</p> <ol style="list-style-type: none"><li>1. OURANOS: Modelling distribution and trends of major climate indicators across Ontario (45km x 45km grids) using a Canadian model (CRCM) <a href="http://www.ouranos.ca/Ontario/Results_html/index.htm">http://www.ouranos.ca/Ontario/Results_html/index.htm</a></li><li>2. University of Regina: Modelling distribution and trends of major climate indicators across Ontario (25km x 25km grids) using the UK Providing Regional Climate for Impact Studies (PRECIS) model <a href="http://env.uregina.ca/moe/rcm/">http://env.uregina.ca/moe/rcm/</a></li></ol> <p>In 2010-11, EMRB funded additional climate modelling projects focused at downscaling climate change indicators to a finer resolution.</p> <ol style="list-style-type: none"><li>3. University of Toronto/SciNet: Modelling Ontario's climate change at high-resolution (10km x 10km) with US Weather Research and Forecasting (WRF) model on the SciNet Supercomputer System. Final report is at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2009-10_UT_Report.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2009-10_UT_Report.pdf</a></li><li>4. University of Regina: Modelling Ontario's climate change at high resolution (25km x 25km) with UK PRECIS Model and further downscaling to 10km x 10km resolution. <a href="http://env.uregina.ca/moe/ds/">http://env.uregina.ca/moe/ds/</a></li><li>5. University of Toronto-Scarborough: Developing future climate change projections over Ontario at annual, seasonal and monthly scales using statistical downscaling. <a href="http://www.scar.utoronto.ca/~gough/stn_results.htm">http://www.scar.utoronto.ca/~gough/stn_results.htm</a></li></ol> <p>Final report is at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2009-10_UTS.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2009-10_UTS.pdf</a></p> <ol style="list-style-type: none"><li>6. York University: Assessing potential changes in extreme winds over Ontario using high resolution data from observation and models. Final report is at <a href="https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2009-10_YorkU_Extreme_Winds.pdf">https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2009-10_YorkU_Extreme_Winds.pdf</a></li></ol> <p>In 2011-12, EMRB funded additional climate modelling projects focused at further improving high-resolution regional climate models and better assess uncertainties.</p> <ol style="list-style-type: none"><li>7. York University: Developing High-Resolution (45km x 45km) Probabilistic Climate Projections over Ontario from Multiple Regional and Global Climate Models. Report and data downloads are at <a href="http://haze.hprn.yorku.ca/moe/">http://haze.hprn.yorku.ca/moe/</a> . Final report is at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2010-11_YorkU_Prob_s.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2010-11_YorkU_Prob_s.pdf</a></li><li>8. University of Regina: Developing High-Resolution (25km x 25km) Probabilistic Climate Projections over Ontario from Large Ensemble Runs of the UK Providing Regional Climate for Impact Studies (PRECIS) Model. Data can be downloaded at <a href="http://env.uregina.ca/moe/">http://env.uregina.ca/moe/</a></li><li>9. University of Toronto/SciNet: Improving Regional Climate Modelling over Ontario at High-Resolution (10km x 10km) with US Weather Research and Forecasting (WRF) model Coupled with HydroGeosphere on the SciNet Supercomputer System. Final report is at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2010-11_UT_Report_s.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2010-11_UT_Report_s.pdf</a></li></ol> <p>In 2012-13, EMRB funded additional climate modelling projects focused on further improving high-resolution regional climate modelling of extreme events and data distribution for easy access to all practitioners.</p> <ol style="list-style-type: none"><li>10. York University: Developing High-Resolution (45km x 45km) Probabilistic Climate Projections of Extreme Events over Ontario from Multiple Regional and Global Climate Models. Results can be found at <a href="http://haze.hprn.yorku.ca/moe/moe1">http://haze.hprn.yorku.ca/moe/moe1</a></li><li>11. University of Regina: Developing Future Projected IDF Curves across the Entire Province and to Make the Project Results and All Associated Data Publicly Available on a Data Portal. Results can be found at the Ontario Climate Change Data Portal (CCDP) <a href="http://ontarioccdp.ca">http://ontarioccdp.ca</a></li><li>12. Trent University: Assessing climate change impacts on Lake Simcoe ecosystems. Final Report as a published paper can be found at <a href="https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2012-13-TU-LSWN.pdf">https://files.ontario.ca/moe_mapping/downloads/4Other/CC/PDF/2012-13-TU-LSWN.pdf</a></li><li>13. Engineering Canada: Vulnerability assessment of climate change impacts on an OCWA facility in Ontario. Final Report is at <a href="https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2012-13-EC-PIEVC.pdf">https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2012-13-EC-PIEVC.pdf</a></li></ol> |

In 2013-14, EMRB funded additional climate modelling projects focused on updating the above projections with the new IPCC AR5 GCM results, further improving high-resolution regional climate modelling science, and promoting usage of the above climate projections for adaptation assessment.

14. York University: Updating the High-Resolution (45km x 45km) Probabilistic Climate Projections over Ontario from Multiple Regional and Global Climate Models published by IPCC AR5. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-YU-CCP.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-YU-CCP.pdf)

The New Data Portal is at <http://lamps.math.yorku.ca/drupal/node/11>

15. University of Regina: Updating Future Projected IDF Curves across the Entire Province and to Make the Project Results and All Associated Data Publicly Available on the above Ontario Climate Change Data Portal. Project is expected to be completed in July 2015.

16. York University: Developing high-resolution regional climate projections over Ontario using stochastic ensemble. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-YU-WRF.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-YU-WRF.pdf)

17. University of Toronto - St. George: Assessing climate change impacts on carbon cycle over ecosystems in Ontario's Far North. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-UT-CCFN.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-UT-CCFN.pdf)

18. York University: Assessing climate change impacts on the James Bay Lowland (JBL) in Ontario's Far North. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-YU-JBL.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-YU-JBL.pdf)

19. University of Toronto - Scarborough: Projecting climate change impacts on human health in Ontario. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-UT-Health.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-UT-Health.pdf)

20. York University: Assessing climate change impact on hydrological cycle over the Lake Simcoe Basin. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-YU-LSHC.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-YU-LSHC.pdf)

21. University of Guelph: Projecting climate change impacts on water quantity and quality, and soil quality over an agricultural land in Southern Ontario. Final Report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2013-14-UG-AGR.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2013-14-UG-AGR.pdf)

In 2014-15, EMRB funded the following grant projects:

22. Design and Delivery of Training Course: "Assessing and Interpreting Climate Change Information for Decision Making". Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/2014-15-RSI-Train.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/2014-15-RSI-Train.pdf)

The Training Materials (Binder) can be found at [http://www.risksciences.com/courses/using\\_cc\\_info\\_for\\_decision\\_making](http://www.risksciences.com/courses/using_cc_info_for_decision_making)

23. Assessing Climate Change Impacts on Droughts and Food Security over Ontario. Final report is at: [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/Final-Report-23.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/Final-Report-23.pdf)

24. A Climate Change Risks Assessment and Adaptation Strategy for York Region, Ontario. Final report is at: [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/Final-Report-24.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/Final-Report-24.pdf)

25. Assessing Climate Change Impacts on Carbon Cycles in the Ontario's Far North Ecosystems (Phase 2). Final report is at: [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/Final-Report-25.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/Final-Report-25.pdf)

26. Assessing Climate Change Impacts on Transportation Infrastructure in Northern Ontario. Final report is at: [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/Final-Report-26.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/Final-Report-26.pdf)

In 2015-16, in response to recommendations made in the Climate Ready Report and the latest Ontario Climate Change Strategy Document, EMRB/MOEC funded the following projects to continue improving the climate data, its accessibility and risk assessment/management practices in Ontario.

27. Design and Delivery of Training Course: "Assessing and Interpreting Climate Change Information for Decision Making". Final report is at: [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/Final-Report-27.PDF](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/Final-Report-27.PDF)

28. Upper Air Climate Trends Observed by the O-Qnet Profiler Network in Central and Southern Ontario. Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/FinalTechReport\\_28.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/FinalTechReport_28.pdf)

29. Developing Extreme Climate Indices for Building Code Calculation in Ontario from the IPCC AR5 Multimodel Ensemble. Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/FinalTechReport\\_29.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/FinalTechReport_29.pdf)

Data can be viewed and downloaded at <http://lamps.math.yorku.ca/OntarioClimate/buildingCode/index.html>

30. High Resolution Climate Change Projections for Ontario and the Great Lakes Basin Region: (Phase 1). Final report is at

## Abstract

31. Developing a Common Set of Ontario-specific High Resolution Regional Climate Projections. Project is expected to be completed in Summer 2018.

32. Developing Additional High Resolution Regional Projections and A Centralized Climate Data Portal. Project is expected to be completed in Summer 2018.

33. State of the Science – Risk Assessment and Management Frameworks/Tools. Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/FinalTechReport\\_33.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/FinalTechReport_33.pdf)

34. Assessing Climate Change Impacts on Carbon Cycles in the Ontario's Far North Ecosystems – Phase 3. Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/FinalTechReport\\_34.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/FinalTechReport_34.pdf)

35. Projecting Ontario's Future Precipitation Extremes based on Historical IDF Curves and Projected Temperature. Final report is at [https://www.ontario.ca/sites/default/files/moe\\_mapping/downloads/4Other/CC/PDF/FinalTechReport\\_35.pdf](https://www.ontario.ca/sites/default/files/moe_mapping/downloads/4Other/CC/PDF/FinalTechReport_35.pdf)

36. Projecting Climate Change Impacts on Algae Bloom over Ontario's Inland Lakes. Project is expected to be completed in Spring 2017.

Results from these MOE funded research projects will provide valuable information for practitioners to conduct climate change impact and adaptation assessments over Ontario.

Listing of climate variable which are considered in Completed MOE Climate Modelling Transfer Payments (projected to 2100)

Temperature related

Annual Mean Temperature

Mean Diurnal Range (Mean of the period max-min])

Temperature Seasonality

Mean daily temperature

Mean daily maximum temperature

Mean daily minimum temperature

Max Temperature of Warmest Period

Min Temperature of Coldest Period

Temperature Annual Range

Mean Temperature of Wettest Quarter

Mean Temperature of Driest Quarter

Mean Temperature of Warmest Quarter

Mean Temperature of Coldest Quarter

Heat wave return-period analyses

99th percentile of daily maximum temperature - probabilistic

1st percentile of daily maximum temperature - probabilistic

99th percentile of daily minimum temperature - probabilistic 1st percentile of daily minimum temperature - probabilistic

Cooling Degree Days (CDD) - probabilistic

Heating Degree Days (HDD) probabilistic

Precipitation/humidity related

Annual Precipitation

Precipitation of Wettest Period

Precipitation of Driest Period

Precipitation Seasonality

Precipitation of Wettest Quarter

Precipitation of Driest Quarter

Precipitation of Warmest Quarter

Precipitation of Coldest Quarter

Intensity, Duration and Frequency (IDF) curves at selected monitoring locations

Flooding return-period analyses

Flooding return-period analyses

Snow water equivalent (SWE)

Monthly mean of SWE

Max daily SWE

99th percentile of daily precipitation rate- probabilistic

Specific humidity

Relative humidity

Wind related

Surface winds gusts and return-period analyses

Soil related

Soil moisture

Soil temperature

Other variables

|                                  |  |
|----------------------------------|--|
|                                  | <p>Total clouds<br/> Net surface long wave radiation flux<br/> Net surface short wave radiation flux<br/> Total downward short wave radiation flux</p> <p>Most of the publicly available data from these projects are with temporal scales of annual, seasonal and monthly; some are down to daily and even hourly scales.</p> |
| <b>Status</b>                    | Complete; historical   |
| <b>Contact</b>                   | <p>Voice: (416) 235-5805<br/> Email: picemail.moe@ontario.ca<br/> Organisation: Ontario Ministry of the Environment and Climate Change<br/> Role: Point of contact</p>   |
| <b>Cited Responsible Parties</b> | <p>Voice: (416) 235-5805<br/> Email: picemail.moe@ontario.ca<br/> Organisation: Ontario Ministry of the Environment and Climate Change<br/> Role: Point of contact</p>   |
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